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ABSTRACT

This paper chronicles the long-term development of a conceptual framework for the training of prospective teachers in the area of computer competence. Today, that conceptual framework drives the curriculum of an information technology course required of students in all teacher certification programs at William Jewell College (Missouri). The four basic application types of the conceptual model include word processing, database management, draw and paint applications, and spreadsheet applications. Internet technologies constitute a new dimension that demands a place alongside of these four basic application types. Topics discussed include the definition of computer literacy by the college's QUE (Quality Undergraduate Education) Committee; funding issues; faculty development and the role of the faculty in the campaign to integrate computer literacy into the curriculum; use of the Macintosh graphical user interface; migration from local area networks to the Internet; evolution of the information technology course; and implications of Internet technologies for the course, including instructor modeling of expected behavior, student projects, reflections, and future plans. (AEF)

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The OTHER Dimension of Computer Competence for Teachers

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Introduction

This study chronicles the long term development of a conceptual framework for the training of prospective teachers in the area of computer competence. Today that conceptual framework drives the curriculum of EDU 215: Information Technology, a course required of students in all teacher certification programs at William Jewell College. Although computing activities appropriate for teachers are integrated into several courses in the teacher education programs, EDU 215: Information Technology is the course in which prospective teachers are expected to learn the basic computer skills needed by practitioners in their profession.

The search for a conceptual framework for the training of teachers in computer competence at William Jewell College can be dated to the work of a faculty committee whose initial mission had been the analysis of the College's general education curriculum, *i.e.*, the Quality Undergraduate Education Committee, locally called the QUE Committee. "Quality Undergraduate Education" was a nationwide initiative of the Council for the Advancement of Small Colleges (CASC), later renamed Council of Independent Colleges (CIC).

Defining Computer Literacy

The QUE Committee had begun its work in the middle 1970's, prior to the advent of microcomputers. As the committee continued its work into the late 1970's, its attention turned to the propriety of computing skills in a liberal arts general education curriculum. It was quickly concluded that a good liberal arts education for the 1980's and 1990's would have to include some kind of "computer literacy." Exactly what skills would constitute computer literacy remained obscure. For instance, must one be able to master one or more computer programming languages to be "computer literate?" Does the ability to use a word processor authenticate one's "computer literacy?" Is there a core of computing skills that would be appropriate for all students?

The QUE Committee eventually concluded that although "computer literacy" must ultimately be defined within the context of one's major field of study, there are some basic types of applications that should receive serious consideration regardless of one's college major. That is, what constitutes computer literacy for an English major may involve a vastly different profile of skills than that necessary for a biology major, a business major, a mathematics major, *etc.* Yet, there would be some

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basic skills essential to all. It would be incumbent upon the respective major departments to develop specific computing skills profiles for their own majors. Subsequent conversations resulted in the campus-wide adoption of the following definition of "global computer literacy" to serve as a core around which the respective departmental, discipline-specific profile of essential computing skills would be determined.

Global computer literacy refers to the acquisition of those computing skills that can reasonably be assumed to facilitate the pursuit of one's academic tasks within her/his own field of study. Minimally, it consists of an awareness of four types of computer applications (*i.e.*, word processing applications, data base managers, draw/paint software, and electronic spreadsheets) and a working knowledge of the applications determined by the respective departmental faculties to be most relevant to the discipline.

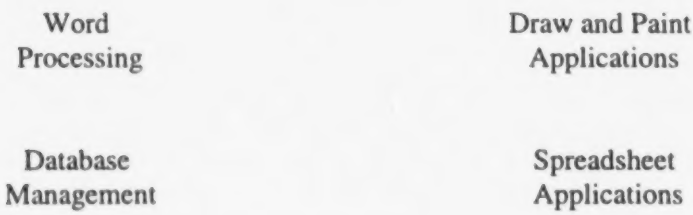

Figure 1. An Initial Conceptual Framework for Computer Literacy

The conceptual framework is remarkably consistent with the "Fundamental Skills and Concepts for Today's Teachers" set forth by the International Society for Technology in Education (ITSE, 1992), which identifies the same four basic applications in which students must "...demonstrate skill in using productivity tools for personal and professional use..."

Funding Issues

The acquisition of a substantial number of microcomputers for student and faculty use was a task that was beyond the capacity of the operating budget and raiding the endowment to support a program that some still considered "trendy" was out of the question. Funding would have to be sought elsewhere.

Fortunately, some philanthropic foundations had also recognized the wisdom of encouraging computer literacy on college campuses. The Speas Foundation awarded a grant that funded the purchase of twenty Apple][computers for the establishment of the first microcomputer lab on campus. The Francis S. Parker Foundation funded proposals for purchasing computers for faculty offices. Restrictions on the grants were minimal. Basically, if the proposal asserted that the faculty member intended to use the computer in any way related to her/his job as an instructor, it was granted.

Faculty Development

Having dealt with the philosophical and financial considerations by way of the usual academic agendum, the faculty soon acquiesced to its own essential role in the campaign to integrate computer literacy into the curriculum. How could a faculty whose collective concept of educational technology equated to using electric typewriters instead of manual ones be expected to model computer literacy for their students? For a computer literacy program to have any sense of credibility it would have to be based on a basic principle: "...if it is essential for the students to be computer literate, then the faculty must be computer literate as well."

To be candid it was recognized that not all faculty members were computer illiterate. Computer competence on campus tended to reside in the faculties of mathematics, business, and the natural sciences, since the computer had been a long-standing tool of research in those disciplines. However, even among those instructors the actual personal experiences in computing had been limited to the use of "main frame" computers at the large universities where they had acquired their advanced degrees or in business or industrial settings where some had worked before beginning their careers in college teaching.

Reactions among faculty members to their anticipated roles in the computer literacy program were predictably mixed. While some quickly took advantage of the opportunity to write proposals for grants to purchase computers for their offices, others attended off campus workshops on basic computing skills and used personal financial resources to buy their own hardware, software, and books to increase their own skills. Still others checked their calendars and calculated the time that would have to elapse before they were eligible for early retirement! One English professor was quoted as having said, "I shall never commit my deathless prose to any such banal electronic gadget." One would hope that it was said tongue-in-cheek; but, nevertheless, the comment accurately reflected an existing point of view among some faculty members.

The QUE Committee, whose name had been changed by this time to Computer Facilitating Committee to more accurately reflect its work, took on the challenge of faculty development. Assuming that word processing would be the type of computer application that would hold the greatest appeal to the largest group of faculty members, the committee arranged for a workshop on the use of the AppleWriter][.

The subcommittee charged with the actual execution of the workshop consisted of a biology professor, a business professor, and an education professor. They decided that the education professor would lead the presentation and demonstration of AppleWriter][. [To this day, I contend that the logic behind this decision was to demonstrate that if an education professor (yours truly) could manage to use the computer, surely the faculty from all other disciplines could master it!]

Enter "GUI"

The place of computer programming in the discipline-specific profiles of essential computing skills was still a point of contention. This question was largely rendered moot with the arrival of the Macintosh with its graphical user interface (GUI) and accompanying mouse. Since pointing, clicking, and dragging could accomplish so many of the practical computing tasks, writing code in

BASIC, AppleSoft BASIC, or any of the more sophisticated programming languages seemed less important as an "essential skill" in most disciplines.

In 1993, funded by a grant from Southwestern Bell, another computer lab was opened. It consisted of twenty networked student computing stations, a server, two laser printers, and an instructor's station connected to an LCD panel and overhead projector. The central processing units were Macintosh Centris 610 models. Although IBM-compatible computers had been considered as possible operating platforms, Windows 95 had not yet arrived allowing IBM-compatible computers the "user-friendliness" afforded by the Macintosh.

"Computer applications" courses, in which students were introduced to the software appropriate to the campus definition of computer literacy, and graphic arts courses were scheduled for regular class meetings in the new lab. Other classes could schedule meetings in the room for special occasions--usually to gain access to the overhead projection of computer images-- on a first come first served basis at times when the room was not in use by its regular clientele.

Migration from LAN's to the Internet

Several local area networks had appeared on the campus as campus-wide microcomputing grew. The purpose of the LAN's was typically to facilitate the sharing of laser printers and, in some cases, databases used by several members of a departmental workgroup.

Throughout the 1994-95 academic year the basic cabling, hardware, and software were installed for connecting to the internet. All working microcomputers owned by the college were "networked" and a drop was installed in almost every room of every building on the campus. Workshops for students and faculty were conducted to introduce the new users of the internet to email management.

The issues related to the process of getting the campus "network-ready" are numerous enough to deserve their own discussion but are beyond the scope of this paper. The purpose of this section of this paper is to establish the fact that the internet had by this time become a real part of campus life and would be expected to have an impact on the local definition of computer literacy.

EDU 215: Information Technology

EDU 215: Information Technology is the current name of the course at William Jewell College that serves prospective teachers. It, like similar courses on other campuses, has evolved from the traditional "audiovisual education" course for teachers. Among the goals and objectives of the original audiovisual education course were operating a filmstrip projector, threading a 16mm projector, designing a bulletin board, laminating instructional materials, VCR operation, using an overhead projector, *etc.* Computing and internet technologies had no place in its curriculum. Computing was something done by those scientific geniuses in horn-rimmed glasses with the plastic protectors in their shirt pockets and, of course, nobody had even heard of the internet.

When microcomputers began appearing in classrooms and talk of their representing only a fad that will soon go away died down, it became clear that teacher training in the use of computers was imperative. It seemed reasonable that the course in the teacher education curriculum most suited to

take on the responsibility was the audiovisual education course.

In light the campus definition of computer literacy (see Figure 1), the new course syllabus included goals related to word processing, database applications, draw and paint software, and electronic spreadsheet applications. Students would be expected to gain an awareness as well as a working knowledge of the four basic types of applications. Due to the pervasiveness of computing in the course curriculum, it was given permanent resident status in the computer lab along side of the computer applications and graphic arts courses.

Except for the necessary elimination of some of the course's traditional goals in order to make room for the computer literacy goals, the plan seemed satisfactory to all interested personnel. The name of the course was changed from "Instructional Media" to "Instructional Technology." It was taught without any major modifications for several years.

The Other Dimension of Computer Literacy

In 1994, when Vice President Al Gore made his famous speech about "a different kind of super highway" many listeners had no idea what he was talking about. According to a government survey in 1996, fifty per cent of U.S. schools have access to the internet (Grabe and Grabe, 1998). The Telecommunications Act of 1996, which contains attempts to remove some current barriers to getting schools connected to the internet, may facilitate the goal of having all classrooms connected by the year 2000.

The internet represents the new challenge to teacher preparation. Skills in the use of internet technologies have to be integrated into teacher training and into our conceptual framework for computer literacy. Internet technologies constitute a new dimension that demands a place alongside of the four basic application types of our model identified earlier. (Figure 2)

Figure 2. An Emerging Conceptual Framework for Computer Literacy

Implications of the "Other" Dimension for EDU 215: Information Technology

Of course the short answer to the question suggested by the title of this section is that the curriculum had to be changed again. But which specific internet technologies should be included posed a more complicated question.

Using the 'net to teach the 'net is a compelling idea. Numerous examples of the internet's use as a delivery system for instructional information in several disciplines (Thomson *et al*, 1997) have been cited. Examples range from simply posting the syllabus or a single assignment on a web server to complete, stand alone on-line courses.

The instructor set out to design some activities that would at least address the "awareness" level of the computer literacy model regarding internet technologies appropriate for teachers. Conversations with other technology instructors along with information (and inspiration) gained through participation in workshops and conferences like ASCUE proved to be the most valuable bases for curricular decision making in this area.

Modeling expected behavior. It seemed logical that internet assignments would have more credibility for prospective teachers as legitimate instructional skills that they could use in their own teaching if the instructor modeled them in his teaching. Some attempts to demonstrate the use of the internet in the teaching of the course follow.

1. The course syllabus was put in *html* (hypertext markup language) form and posted on the college's web server. Other education professors were encouraged to do the same.

http://www.jewell.edu/~education/syllabuses/media.html

2. Students were encouraged to visit the instructor's personal web pages.

http://www.jewell.edu/~education/stocktonm
http://www.sky.net/~mjstock/
http://members.aol.com/mjstockton/

3. A self-paced tutorial for one of the class assignments was placed on the served along with some graphics that they would use in making their own web pages.

http://www.jewell.edu/~education/stocktonm/webmaking.html
http://www.jewell.edu/~education/stocktonm/icons.html

4. Students' pictures were taken with a digital camera and displayed on the class's home page with links to some resources for the class projects. The captions under their pictures served as hyperlinks to their own web pages which they would be creating in the class.

http://www.jewell.edu/~education/EDU215/

Student projects. The student projects designed to introduce them to the internet included the following:

1. Email projects. Students were given the instructor's email addresses on the first day of class and asked to use them for routine communication during the course. At least one email with an attachment was required.
2. Web page project. Each student was required to design a personal web page to be posted on the college's web server and used in their formal presentation of the project in class.
3. Internet search projects. Students were asked to use various search engines to find information that would be needed in completing other class projects.
4. Downloading project. In connection with other projects, especially the web page project, students were required to download shareware or freeware that would be needed (*e.g.*, html editors).

Reflections and Future Plans. This story is not without its down side. As new material is introduced into any course it crowds other material out, unless the credit hours' value of the course is increased. One wonders how prospective teachers will acquire the technology skills needed for their work that have been eliminated from the course in deference to computing and internet skills.

Grading the activities described here does not seem to fit the traditional academic mode. Rubrics that have been created for some of the projects need to be expanded to define the standards of an "A" project, a "B" project, *etc.*

Electronic plagiarism has been a problem. Often students underestimated the time that their web page project would require. Occasionally, as panic set in near the project deadline a computer savvy friend was called on to design the web page. Perhaps progress reports required at various intervals can help to avoid this problem.

Among the positive outcomes of the emphasis on internet skills has been the classic phenomenon that motivates all teachers: the look of wonder in the face of a student who has mastered a skill that s/he thought impossible just a short time before.

Even with the modest beginning described in this paper, the plan to integrate internet technologies into this course and others is destined to grow. Some additions to the course anticipated in the near future include the following:
1. Using *webforms* for tests and practice activities;
2. Establishing a *listserv* for routine course communication;
3. Video conferencing, perhaps with another information technology class;
4. Uploading articles to newsgroups; and
5. Adding on-line tutorials for other class projects.

Other ideas will almost certainly develop as the result of the instructor's participation in the 1998 ASCUE Summer Conference.

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http://www.sky.net/~mjstock/ http://members.aol.com/mjstockton/

Tutorial on Web Page Design http://www.jewell.edu/~education/stockton/webmaking.html